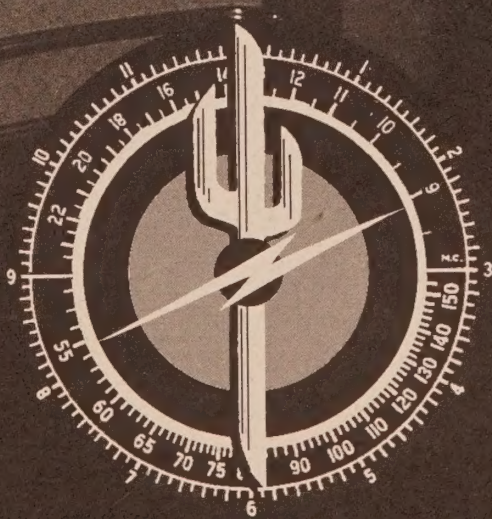
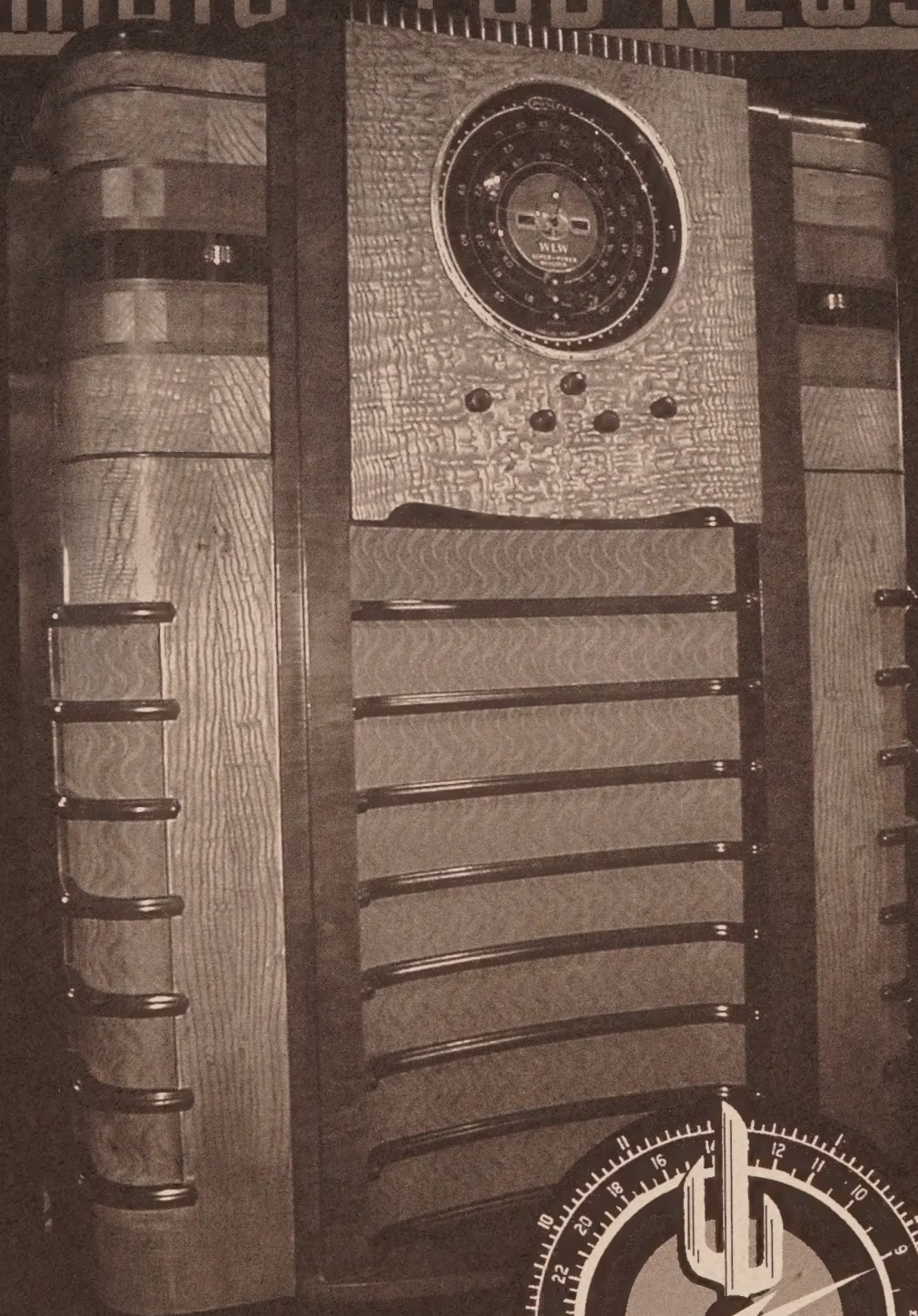


ARIZONA ANTIQUE RADIO CLUB NEWS



Vol XIX, No 3 Fall 2002

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ARIZONA ANTIQUE RADIO CLUB NEWS

Vol XXIX, No 3 Fall 2002



Arizona Antique Radio Club

www.azarc.org

The Arizona Antique Radio Club was organized in 1983 for the preservation of the history and artifacts of radio and television, and for the advancement of knowledge and appreciation of radio technology and communication. The Club is a non-profit corporation organized primarily for the mutual assistance of radio devotees and collectors in Arizona. Membership, however, is open to any persons who have an interest in radio and television history, preservation, restoration, and collecting.

Meetings are held from October through May and consist of touring collections, presentations of technical, historical or restoration information, thematic displays of radios and the autobiographical experiences of the members. Our antique radio Swap Meets are scheduled for Spring and Fall meetings. Members of the Board of Directors are elected at the annual business meeting in May. Most meetings are held on Saturdays in the Phoenix and Tucson areas, and when possible, elsewhere within Arizona.

Membership dues are \$18 (individual) or \$20 (family) per calendar year and provide access to all club benefits including the quarterly issues of the *Radio Club News*. Send dues or membership inquiries to: **Arizona Antique Radio Club, 1820 W. Raven Dr., Chandler, AZ 85248, phone 480-855-1282.**

The Arizona Antique Radio Club News is the quarterly publication of the Arizona Antique Radio Club, Inc. It is mailed First Class to current members.

Contributions: submission of articles, news items, fiction, photographs and other materials relating to radio history and collecting are greatly appreciated, particularly if they have an Arizona connection. All members are encouraged to broaden their interest in the hobby by sharing their experiences, opinions, knowledge and observations with the club through its publication. Send materials for publication to **Arizona Antique Radio Club, 2025 E. LaJolla Dr., Tempe, Arizona, 85282-5910. Phone is 480-730-6058.** Email: lettow@yahoo.com.

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2002-2003 A MIXED BAG

It is now June, 2003 and AARC's recent season of meetings is now over, with mixed results. Before we disappear entirely into our cool caves for the summer let's take a look at what happened.

On the plus side:

- Attendance at the October 2002 potluck dinner was good with a lot of interesting items displayed for show and tell.
- The Fall Swap Meet in November remained our most popular event with many buyers and sellers, a decent auction and the signup of several new members.
- Continued good turnout for the Tucson Swap Meet in January 2003. This was the second year in its new location and a lot of new interest was generated in the club.
- In February we had a nice display at the Tempe Historical Museum thanks to the work of a few members.
- Membership levels remained steady.
- Our website continued to improve; members could get information easily on AARC, and other clubs' events.
- New issues of the *Radio Club News* were well received.
- Our treasury is in great shape with a healthy surplus.

On the minus side:

- Communications and scheduling snafus caused confusion and late or no notice to members about events in February, March, April and May.
- Attendance at the Spring Swap Meet and the Radio Roundup were off significantly from previous years'.
- Membership levels remained constant despite a population explosion in Arizona.
- Contributions of stories to the *Radio Club News* have all but dried up and frequent contributor Harry Hyder wasn't able to continue providing us with his articles.
- We did not have elections in May of this year due to a number of problems.

OFFICERS MEET

An email problem may have been responsible for only six people showing up for an open meeting on May 31, 2003, at the home of Vice-President Carl Roberts.

Since five of the six were club officers and the sixth was Clyde Watson, the meeting became an "executive session" devoted to discussing the future of the club, how to remedy the mistakes made in the last year, and various proposals to alter the bylaws to accommodate changes in the membership and direction of the radio club.

Also discussed was the future publication schedule of the *Radio Club News*, improvements to speed up the website, and our financial situation.

Announcements on these matters will be made later in the summer. ¶

The Crosley WLW

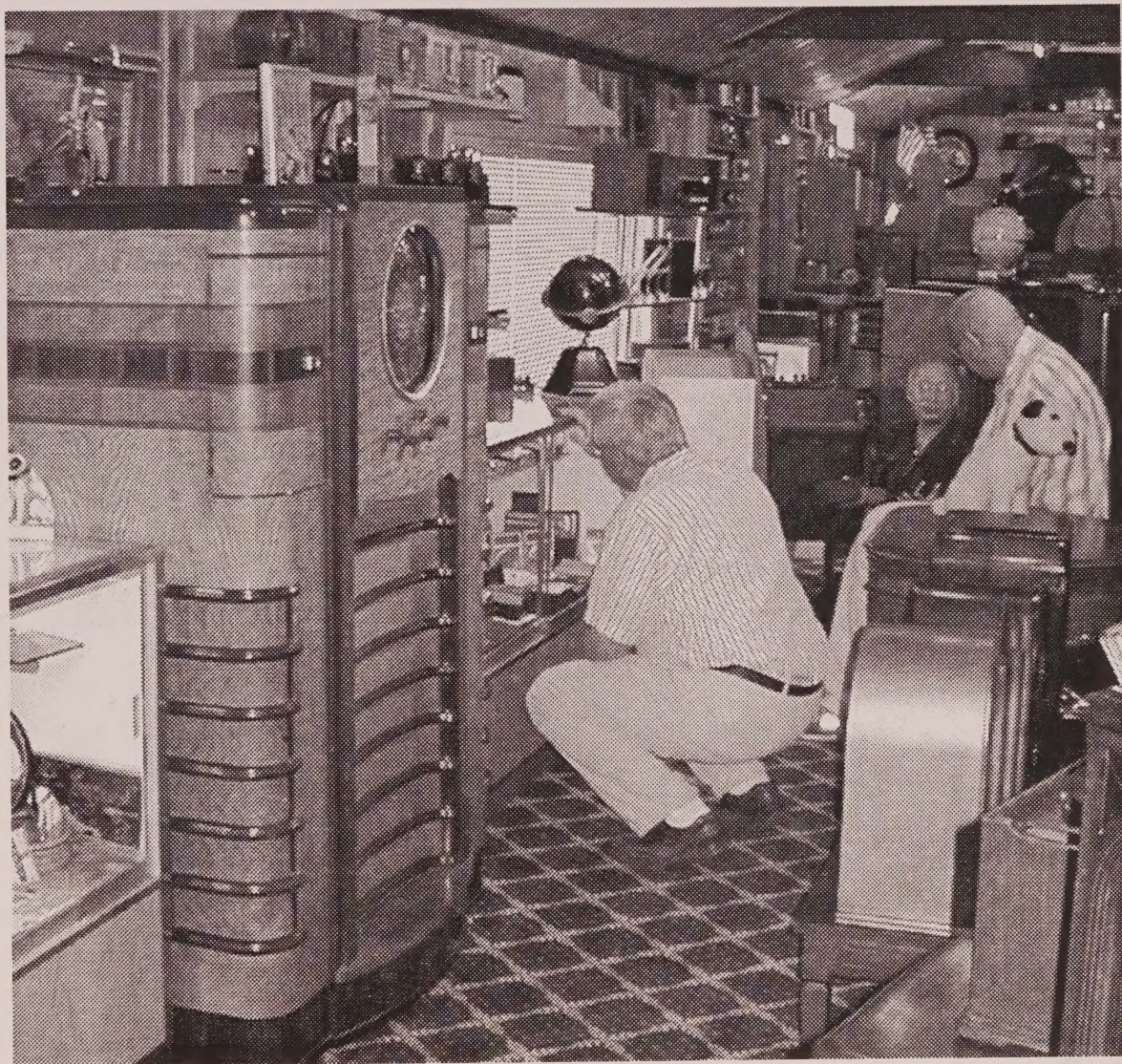
and the
Martin Bergan
Collection



In May of last year, 2002, club members had the opportunity to visit the extraordinary antique radio collection of Martin Bergan. The club had not seen it since 1998, and since then the collection had amazingly moved with Martin to Florida and then back again.

But no packing boxes were in sight as the radios and many related items were brilliantly displayed with everything polished and well lighted.

Martin did a monumental job to ready the collection for display and was as usual a kind and informative host. The only disappointment was the very low turnout of members in attendance. It was May, traditionally in our club a bad month for attendance. But your Board of Directors was left scratching its



collective heads and wondering why anyone would miss the chance to see one of the finest collections of antique radios on Earth.

Speaking of Earth, and an alien attack on it, we also got to see the original transcription disks of Orson Welles' "War of the Worlds" broadcast. The two massive disks join the other rare and remarkable items in the collection.

In the past we marvelled at the size of the Sparton "Nocturne" and Zenith "Stratosphere" in the collection. This time we were blown away by a new addition, an extremely rare 1937 Crosley WLW console, with its mas-

sive cabinet nicely restored by Mark Toppo. This set, which is more legend than reality until seeing it in person, deserves special treatment, so we have three articles devoted to it; an article by Dan Gutowski comparing the WLW to its smaller cousin, the 1516, a description of the audio amplifier section from *Service* magazine, and an article about a feature of the WLW, the unique "Auto Expressionator".

More photos of the collection can be found towards the middle of this issue. And finally we want to thank Martin for hosting the club and for all the work he did to make his collection shine. - Bill Lettow



The Crosley WLW and the Model 1516

By Dan Gutowski

Editor's note: this article appeared in the June 2002 issue of the Michigan Antique Radio Chronicle and is reprinted here with the permission of the author.

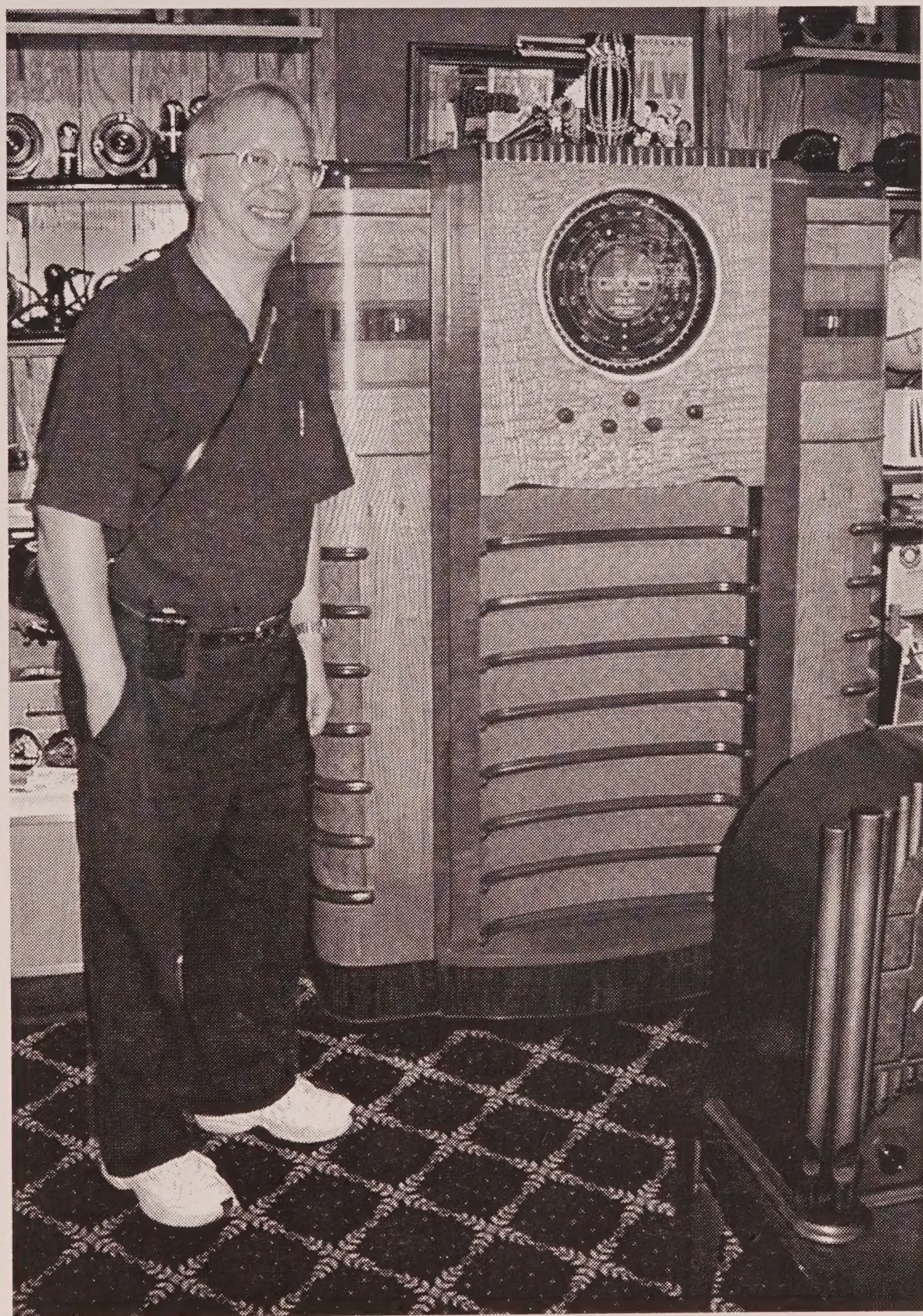
If a magic genie were to grant you a wish to have the largest, high tube count, most expensive "consumer brand" pre-war console radio ever made, contrary to what some of you may think, it would not be a Zenith Stratosphere, but the Crosley WLW.

The Crosley Radio Corporation introduced the ultimate in radio receivers in early 1937. The WLW boasted 37 tubes and six speakers, continuous coverage from 540 kHz to 18300 kHz, power output from 50 to 75 watts, and a list price of \$1,500.00, twice the cost of a Zenith Stratosphere. The speakers consisted of one

18-inch speaker for low frequencies, two 12-inch speakers for midrange, and three high frequency tweeters. It came equipped with all metal tubes, except for the auto expressionator tube, spread over four individual chrome-plated chassis. The WLW was capable of reproducing 20 to 20,000 Hz and tested at 25,000 Hz. Controls consisted of auto expressionator, bass compensation and six-step tone control, in addition to a three separate volume controls for low, middle, and treble audio ranges. It also served as a public address system. This massive radio stood four feet ten inches high, 42 inches wide, and 22 inches deep, weighing in at 475 pounds.

Crosley's "golden" year of technical achievement was the 1937 model year. This line of radios boasted the highest tube counts and specialized features that Crosley ever manufactured. Crosley introduced the WLW in this line, which was the largest set ever seen by a "consumer brand" radio company, but unfortunately, any one of us would probably have a better chance of winning the lotto than acquiring one of these sets. On the other hand, their next best radio (model 1516), a fifteen tube set offered in the 1937 line, I have found shares the same receiver

Dan Gutowski collects high tube-count consoles from 1933-1942 with special interest in RCA Victor and General Electric. The above article is from his ongoing series featured in the Michigan Antique Radio Chronicle. Dan can be contacted at P.O.Box 142, Dexter, MI 48130. Phone is 734.718.7450. Email: dg16ms26@msn.com.



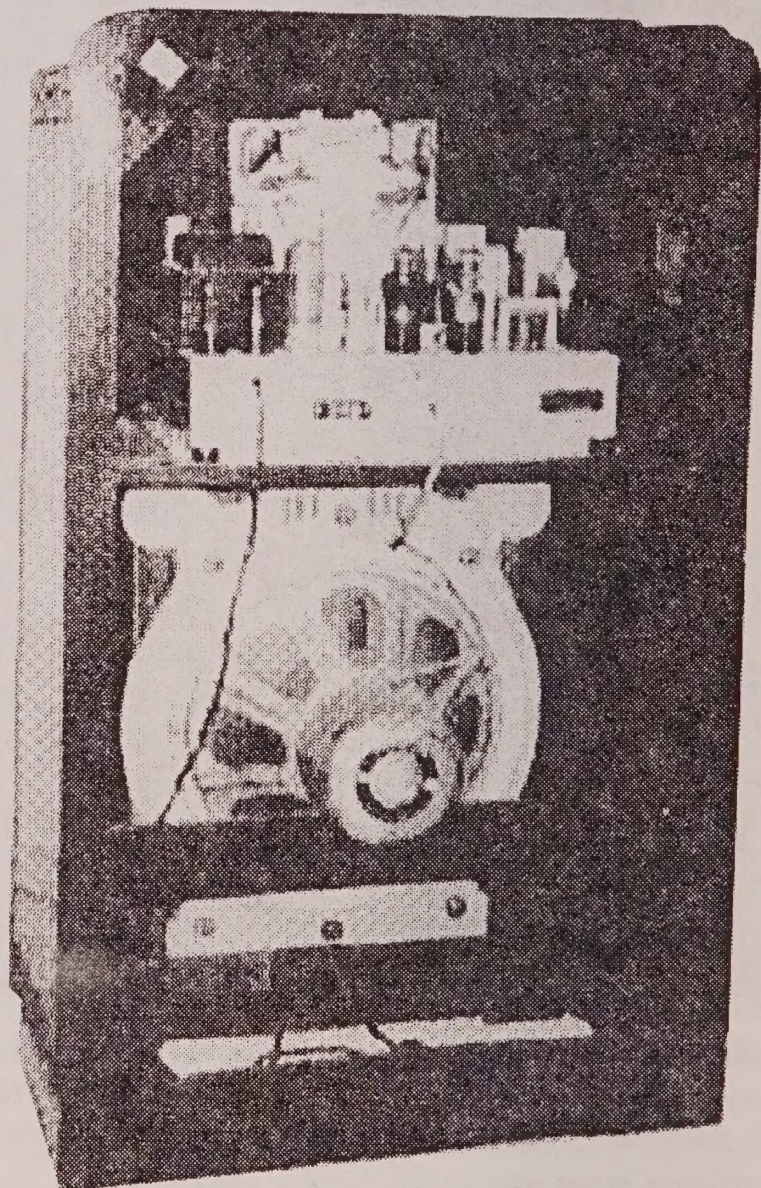
The Crosley WLW in the Martin Bergan collection is nearly as tall as Tucson club member Stephan Lew, who now knows what he wants for Father's Day.

chassis as the WLW, or model 3716, except the dial size of the WLW is larger, measuring twelve inches across, where the 1516 measures around 7-8 inches. The 1516 quite nicely would make a feasible substitute for all of us collectors longing for a WLW radio. Although this radio is quite rare as well, one did appear on eBay last year.

The main difference between these radios is that the 1516 chassis drives a fifteen-inch speaker utilizing a pair of 6N6 tubes, whereas the 3716, with its identical main chassis, interconnects to three additional chassis that we'll look into later. Both sets have a continuous frequency coverage of 540 kHz to 18 MHz in three bands, automatic frequency control, a six-step fidelity sounding board", and the "auto expressionator". The sounding board was simply a specially cut board to which the speaker was attached designed to resonate at certain frequencies to enhance the tone. What the auto-expressionator actually does is expand the volume range of the received signal so that it more closely resembles the volume range of the original music from the station. This produced greatest musical depth. Other features were the

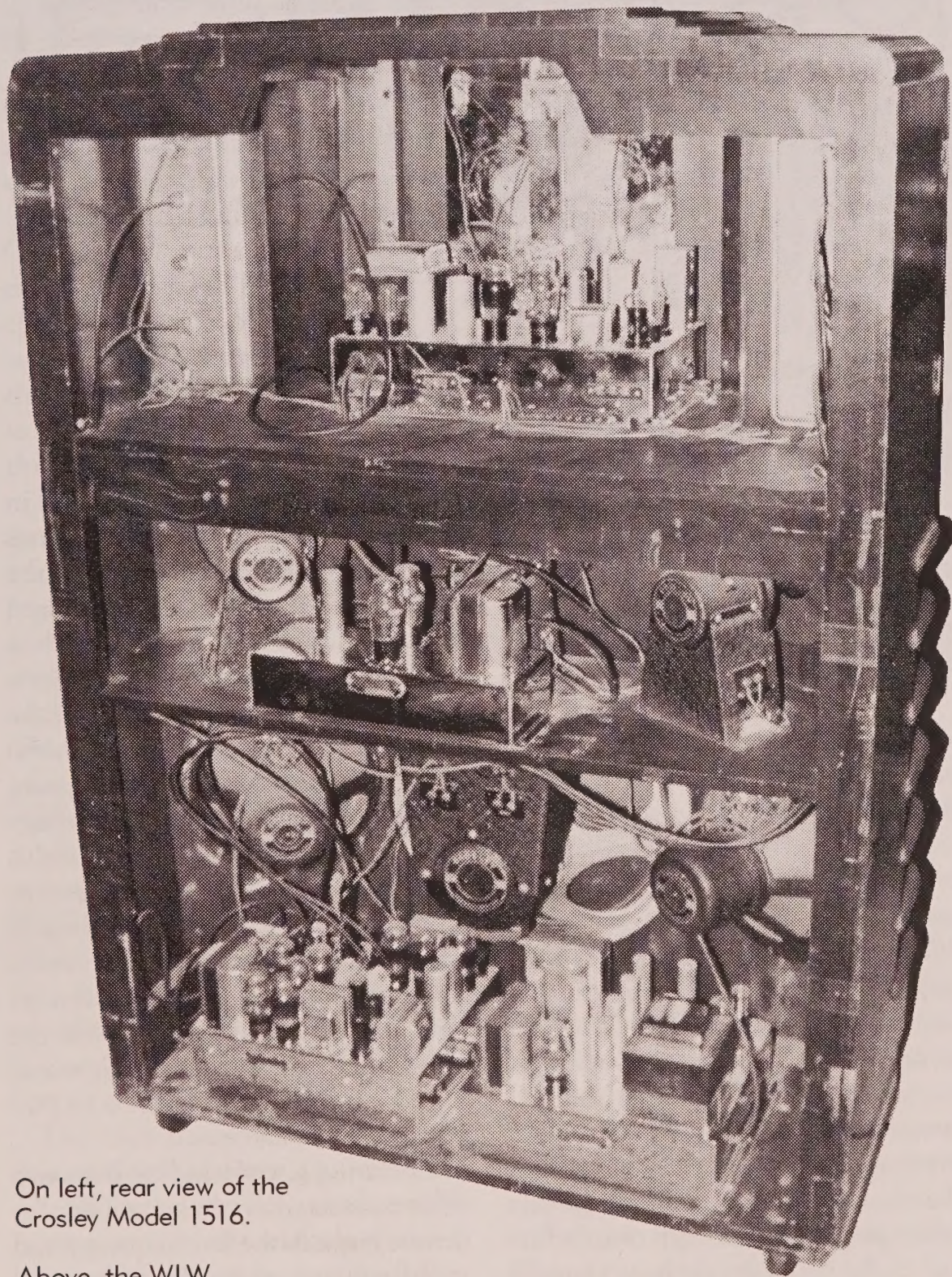
"mystic hand", a two-speed dial drive in a single-control knob, a unique neon tube tuning indicator, and a floating "sub-chassis" or tuner, that was isolated from the main chassis by rubber mounting sleeves. The "mystic hand" was the term Crosley used to describe the AFC circuit's ability to "pull in" a station even when you were slightly off tune. The 1516 had a power output of 25 watts, whereas the 3716 produced 75 watts. The receiver chassis is shown on page 10.

One other Crosley radio in the 1937



line that is very similar is the model 1316. This set also shares the same receiver chassis as the 1516 and 3716, but with only one rectifier tube (5Z4), and it omitted the indicator amplifier tube (6C5).

Crosley did manufacture some notable receivers in years prior to and after 1937, but the 1937 line was the only year Crosley offered 13+ tube radios and an array of advanced features. ①



On left, rear view of the
Crosley Model 1516.

Above, the WLW.

In the low frequency channel four 6N6 output tubes operating in parallel push-pull are driven by the above-mentioned 6F6s by means of audio choke coupling. In the mid-frequency channel there are two 6N6s in push-pull, which are also driven by the 6F6's.

The third winding C of the input transformer T terminates in 500 ohms and forms the high frequency audio channel of the power amplifier.

The choke CH2 with the condenser C in parallel forms a high-pass filter that is augmented further in the circuit. Working out of winding C there is a 6C5 tube resistance coupled to the 6F6 connected as a triode, which in turn drives two 6N6s push-pull through audio choke CH3.

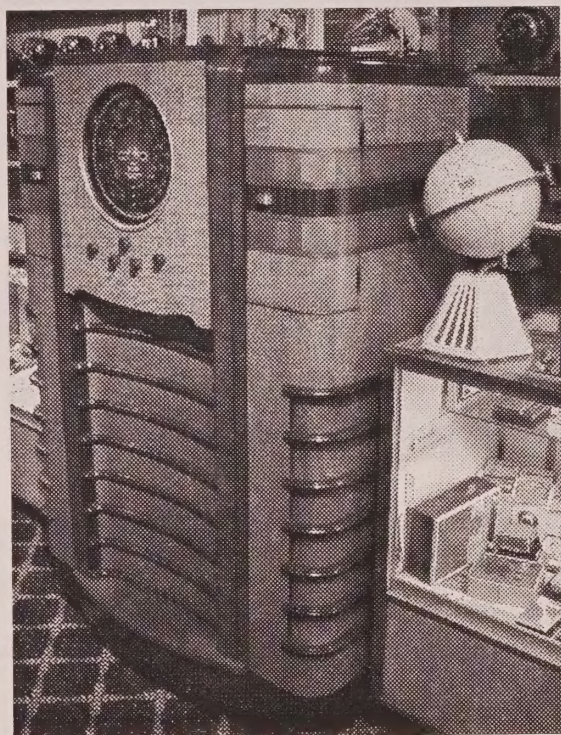
The low frequency channel has a range of from 20 cycles to approximately 400 cycles, part of the filtering being in the output transformer and part of it through the condenser, choke, and resistor combination ahead of the parallel push-pull 6N6 tubes. This channel has a maximum output of approximately 40 watts.

The mid-frequency channel has a range from about 300 cycles to approximately 3,000 cycles with a maximum power output of about 18 watts. Again filtering action here is obtained through the output transformer and the condenser-resistor combination ahead of the 6N6 output tubes.

The high frequency channel has a frequency range from 2500 cycles to 12,000 cycles. It was found possible during tests to obtain frequencies as high as 25,000 cycles but that pres-

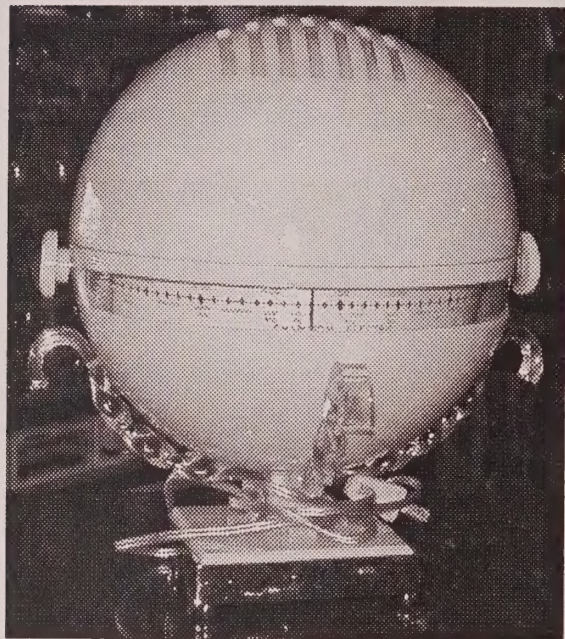
ent day broadcast facilities do not lend themselves to the reception and reproduction of these higher audio frequencies, and therefore, 12,000 cycles was set as the upper limit of audio frequencies. Power output of this channel is about 12 watts.

One 18-inch auditorium speaker



type of speaker is used for the low frequency output, two 12-inch speakers are used for the mid-frequency output, and three high-frequency diaphragm type speakers or tweeters are used for the high frequency channel. In the cabinet, the 18-inch speaker is mounted as low as possible and in the center of the cabinet with the two 12-inch speakers on each side set at an angle of approximately 30 degrees with the front plane of the cabinet. One tweeter is mounted directly above the large speaker with two on each side at the same angle with the front as the 12-inch speakers. ❶

Highlights of The Bergan Collection



We would need a whole book to do Martin's collection justice, but on the next eight pages are a few highlights.

On the left, extreme style in this Champion Electric white sphere radio. The dial markings indicate it is a British set.

Below, the original transcription disks of the Mercury Theater of the Air's 1938 performance of the "War of the Worlds". This was the broadcast that had the country in a panic, demonstrating the promise and peril of radio as a broadcast medium.

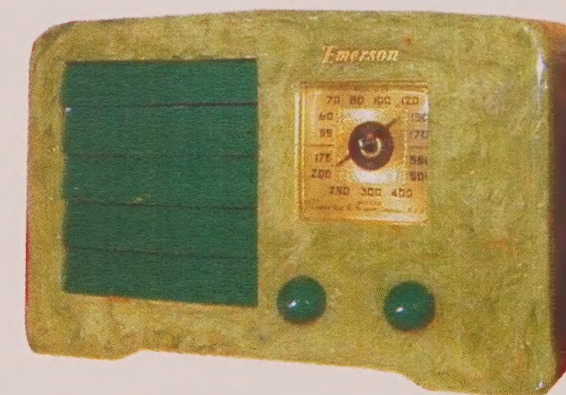
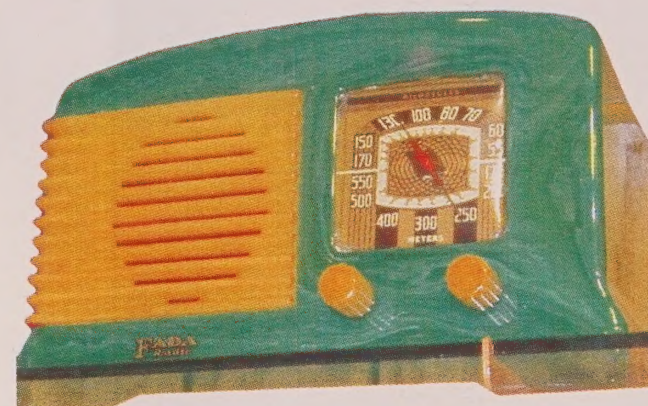




At left, an advertising sign for a Motorola timer dial; below, an extremely stylish deco Air King, and a unique Motorola radio/phonograph console with the turntable under the top lid. Undoubtedly someone has already nicknamed this the Motorola "Trashcan", let's hope this is one nickname that won't stick.



The Bergan Collection

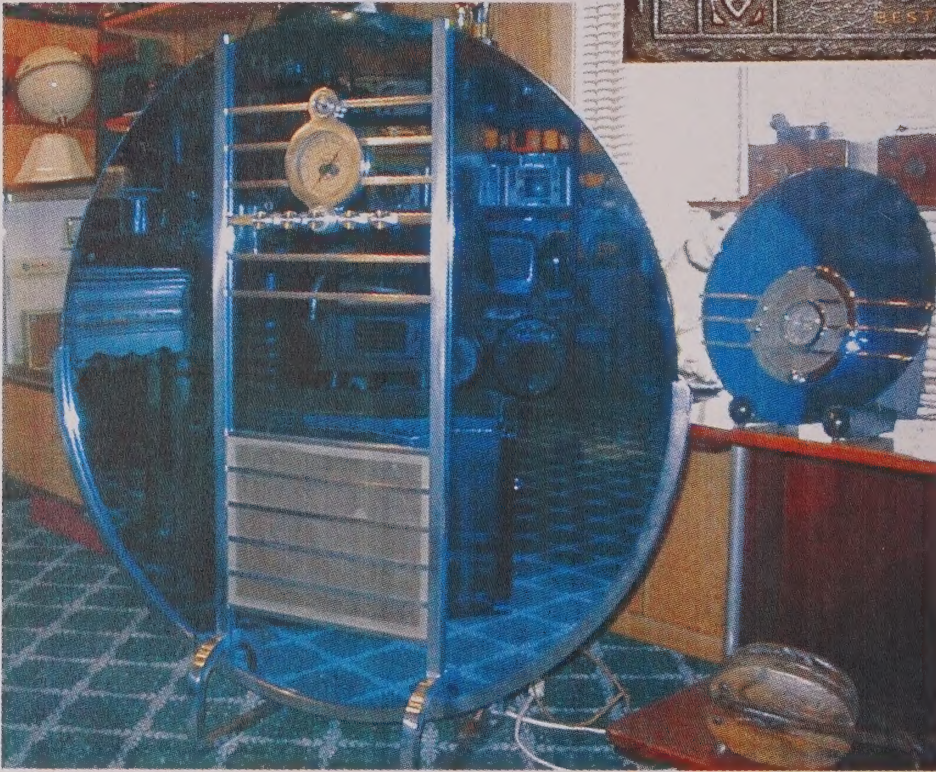


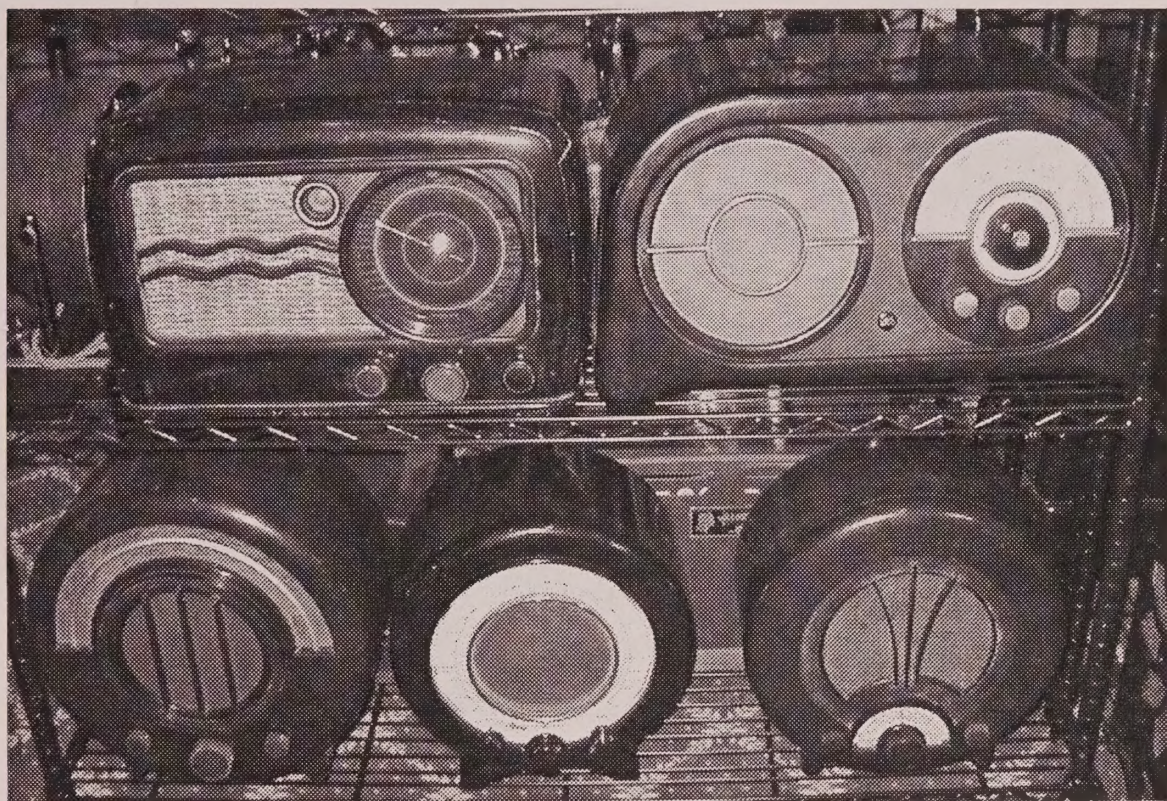
Undoubtedly one of the world's most complete collections of catalin radios is displayed on one long, breathtaking wall.

Below, a stunning collection of Addisons. They were made in catalin, other plastics or a combination of the two.



A low-budget Depression era radio by Best finds a place among some of the most valuable antique radios anywhere, the Sparton "Nocturne" and "Bluebird" and three variations of the Zenith "Stratosphere".





Above, examples of the golden age of British bakelite.
Below, a simple nameless radio with a Mexican theme.

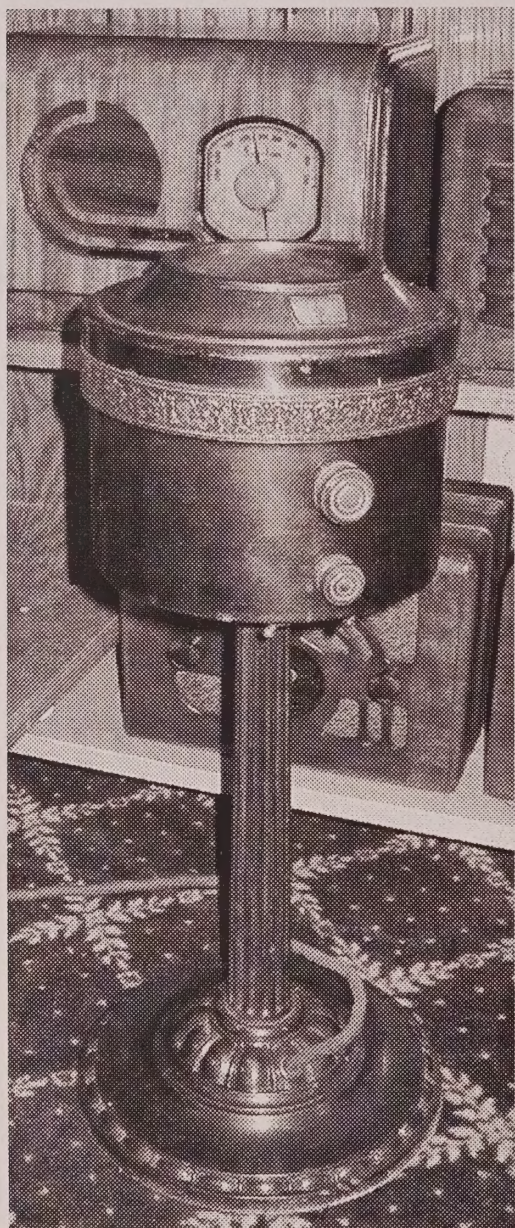


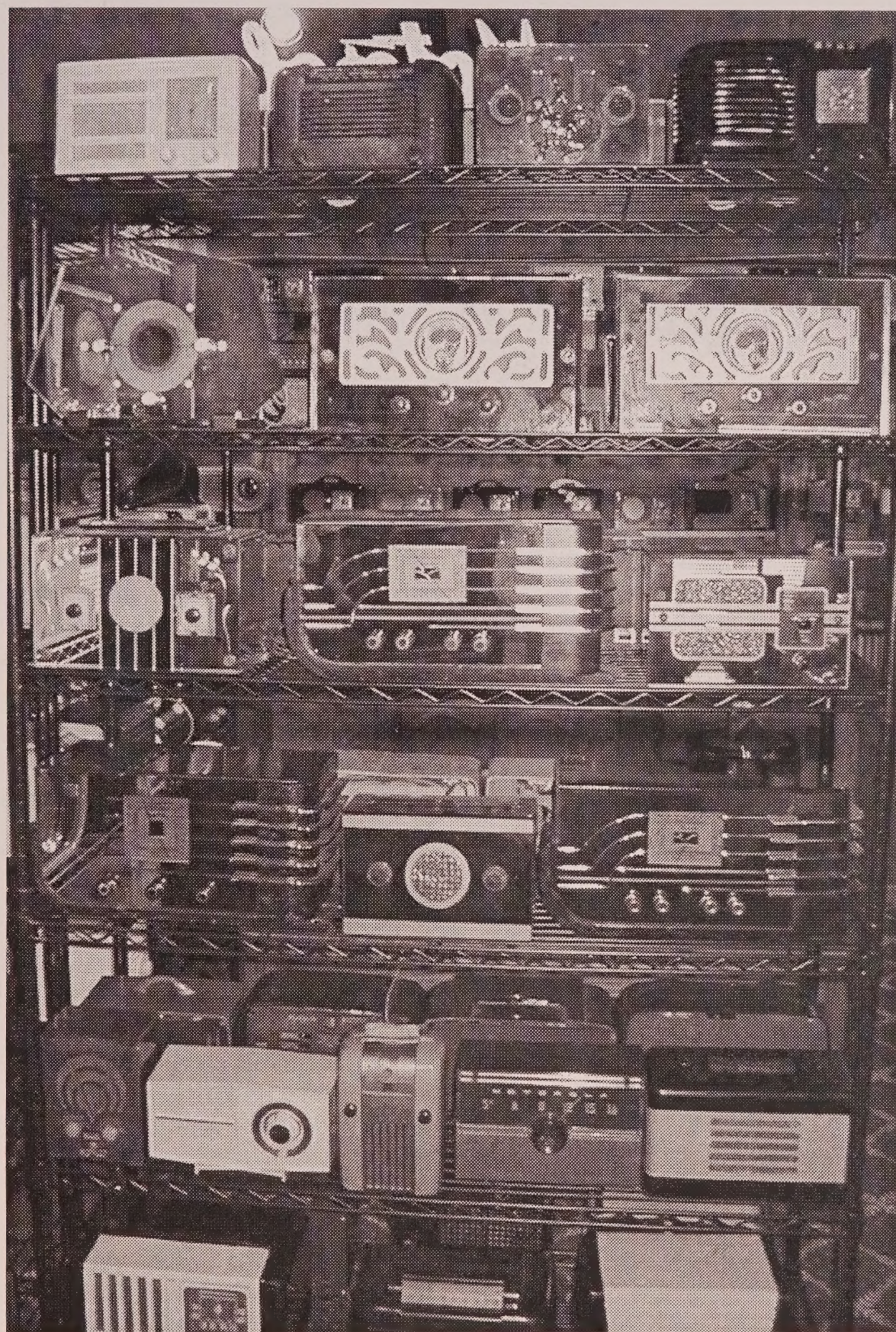


Above and below, a nice collection of Abbotwares statue radios. the top-less woman at the lower right holds a lighter.

At left, this ashtray includes a built-in radio. Smoking must have been to radio listening what today junk food is to TV viewing.

At right, a group of mirrored radios including a rare peach colored Sparton 558 in the center.





THE CROSLEY AUTO EXPRESSIONATOR AND PHANTOM CONDUCTOR

By Brian Belanger

Editor's note: this article originally appeared in the January 1998 issue of Radio Age, the newsletter of the Mid-Atlantic Radio Club, and is reprinted here with the kind permission of the author.

Even though the Crosley Radio Corporation did make automobiles for a short time, the Crosley Auto Expressionator has nothing to do with automobiles. It is actually an obscure bridge-type volume expander circuit used in some better quality Crosley radios of the mid-to-late 1930s. If you are not familiar with this circuit, it can be a source of great puzzlement when you first encounter it.

When you examine an Auto Expressionator equipped Crosley, you will notice what appear to be two pilot

light bulbs sticking out of the chassis. However, these bulbs are not to light up the dial. One's first reaction is likely to be, "Why would anyone install two pilot lights close together in the middle of the chassis? What were they supposed to be illuminating?"

Examining the circuit diagram adds to the mystery. You will see that the two "pilot lights" on the chassis are not wired into the filament circuit as with normal pilot lights. (There are other pilot lights serving the normal function.) Instead, these special bulbs are wired into a circuit interposed between the output transformer and the loudspeaker. At this point, you are likely to be thoroughly confused. But, once you realize that these bulbs form part of a volume expander circuit, it all begins to make sense.

When you listen to a symphony orchestra in person, the difference between the loudest and softest pas-

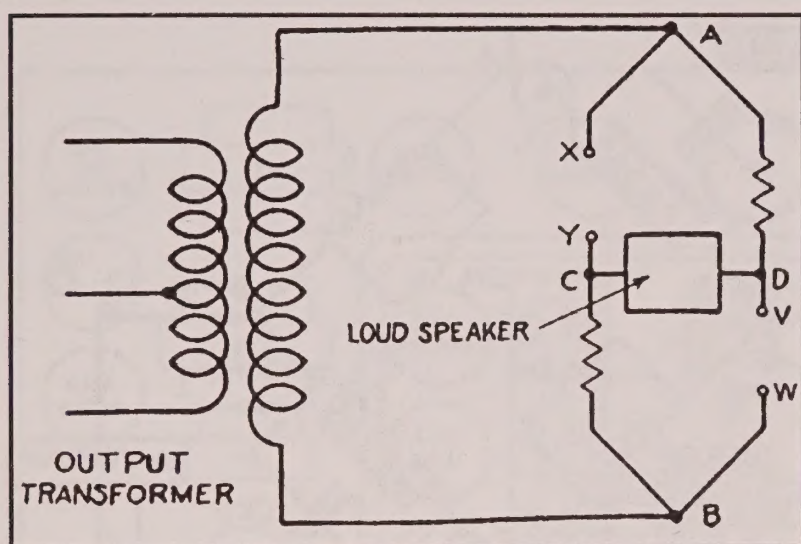


Fig. 1. In the Auto Expressionator circuit, the loudspeaker is connected in a bridge circuit across the output transformer.

sages may be as much as 100 dB. Ordinary AM broadcasting equipment is not designed to handle such a wide volume range, and so compression of the dynamic range takes place. During the mid-1930s, when this Crosley innovation appeared, the difference between the loudest and softest passages was in the 40-50 dB range for most broadcasting stations. So, Crosley engineers decided to incorporate into their better receivers a volume expansion system that would make loud passages even louder and soft passages even softer. They called it the "Auto Expressionator."

Crosley also designed their Auto Expressionator circuit to overcome a shortcoming of most radios of the era — the fact that the response of the typical audio amplifier/loudspeaker began to drop off significantly for frequencies less than about 100 Hz. Good bass response was a real selling point for radio manufacturers of the 1930s. Most 1920s radios with their tinny-sounding horns or cone speakers had poor bass response, so in the early 1930s, when powerful electrodynamic speakers with frequency

responses extending much lower than their predecessors became commonplace, consumers were delighted by the improvement in tone. A typical buyer of a new 1930s console would invite the neighbors in to listen, and would turn the tone control down, saying, "Just listen to that great bass response!" (Of course by doing so, the listener was just bypassing some of the high frequencies to ground rather than improving the bass response, but that is another matter.)

As a kid, I recall well listening to 1930s-vintage consoles in the homes of friends and family. Invariably, most people tended to set their tone controls so as to unrealistically accentuate the bass response. Aware of this propensity of customers to want strong bass response, Crosley thus designed into the Auto Expressionator a resonant circuit to accentuate the bass response.

Let's examine what is actually going on in this circuit. (If you understand how a Wheatstone bridge operates, this explanation will be easier to follow, since the Auto Expressionator is based on the balanced bridge con-

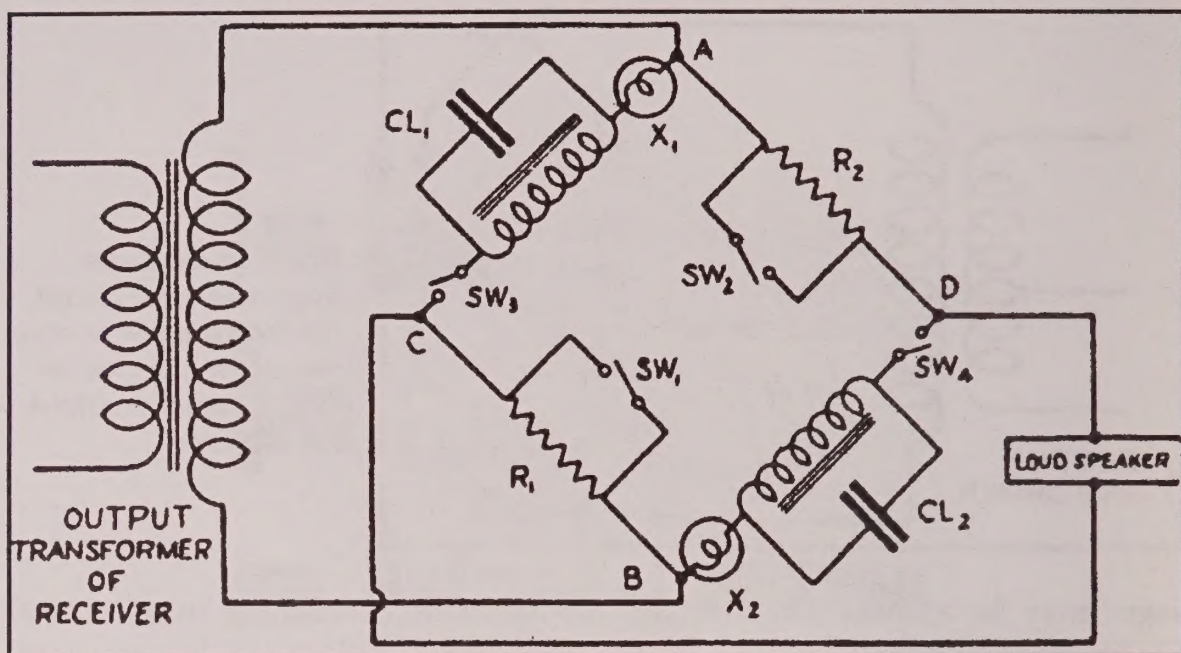


Fig. 2. The complete Auto Expressionator circuit with bass compensation included.

cept.) Consider Fig. 1. The current in the loudspeaker voice coil flows from the output transformer through the top resistor, the voice coil, and the bottom resistor. This is no different from a normal radio except that there is some loss in the two resistors in series with the voice coil.

If identical resistors were connected between X and Y and between V and W, we would have a balanced bridge. The electrical potential at points C and D would be identical, and no current would flow through the voice coil. But if the resistors in opposite arms were both increased or decreased by the same amount this would unbalance the bridge, and a voltage would appear across the voice coil between C and D. The important point is that the more unbalanced the bridge, the greater the signal that appears across the voice coil.

Now examine Fig. 2. Elements X1 and X2 are small light bulbs made with

special filaments having a very strong temperature coefficient of resistivity. Their resistance is very low when the filaments are cold, but high when the bulb lights and the filaments warm up. If switches SW1 and SW2 are closed, and switches SW3 and SW4 are open, then the resistors are shorted out and the bridge arms containing the coils, capacitors, and bulbs are out of the circuit. In that configuration, the radio is an ordinary radio with the speaker connected directly across the output transformer. But, if the switch positions are reversed, we have a bridge circuit with the resistors in one set of opposite arms and the coil/capacitor/bulb elements in the other set.

Now let's examine the tone compensation part of the circuit. The coil/capacitor parallel resonant circuits are designed to resonate at about 40 Hz. The values of the resistors in the other arms of the bridge are selected to have

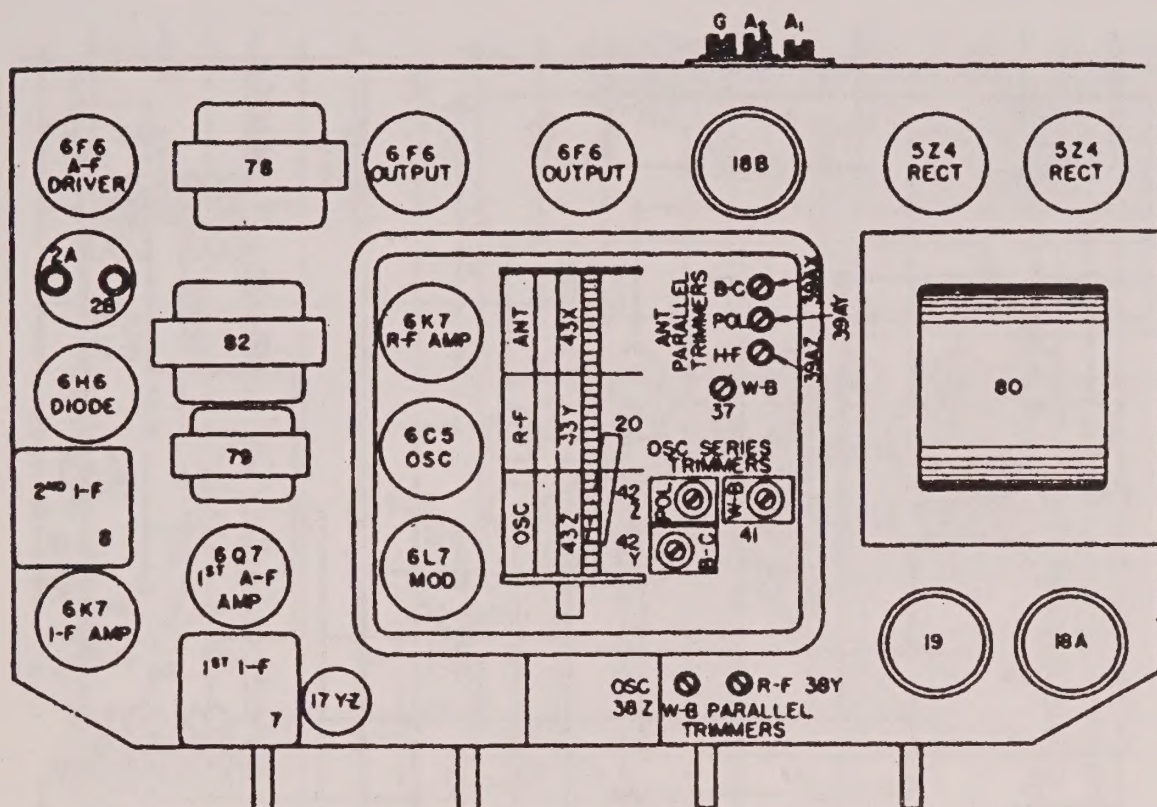


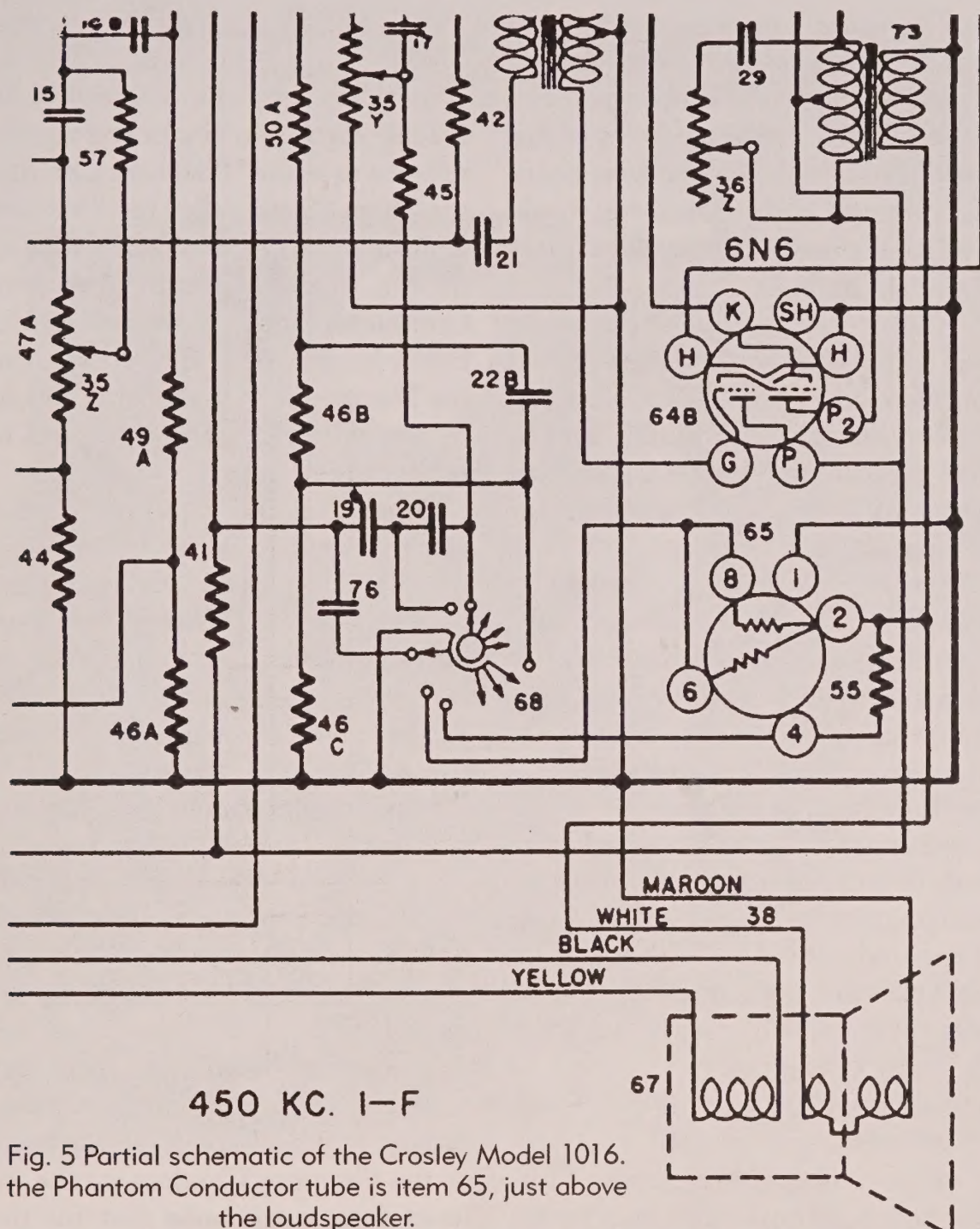
Fig. 3. Chassis layout of the Crosley Model 1155. the Auto Expressionator lamp bulbs (items 2A and 2B) are just below the 6F6 tube in the upper left corner.

an impedance quite different from that of the parallel resonant circuit at 40 Hz. So in the frequency range below roughly 100 Hz, the bridge becomes unbalanced and a higher voltage appears across the voice coil, thereby accentuating the bass response. As the audio frequency increases well above 100 Hz, the impedance of the capacitor becomes less and less, such that the series impedance of the parallel resonant circuit quickly becomes negligible compared to the resistance of the bulb filament.

The resistance of the bulbs, even when cold, is greater than the resistance of the resistors in the other arms, so the bridge is always slightly off balance. As the bulbs light, their resistance increases, throwing the bridge further out of balance. By choosing

the right values of all the components, the bridge can be made to be near balance for soft passages when the signal applied between points A and B is relatively small. Since the bridge is near balance, the signal applied to the voice coil will be diminished for the soft passages.

But, as the signal increases, more current flows through the arms containing the bulbs. The bulbs warm up, throwing the bridge further out of balance and increasing the signal applied to the voice coil. The louder the passage, the more out of balance and the more signal applied, hence loud passages are accentuated. Because there is some loss in the bridge circuit, the radio had to have sufficient output power to overcome these losses and still have plenty of volume when the



of having a separate coil and capacitor in each of the two opposite bridge arms, this radio uses a two-winding transformer for the inductances and a single capacitor in the secondary that resonates with both coils. The capacitor is part 36 near the top of the figure and the transformer is part 79 just below it. The two bulbs are

parts 2A and 2B in the center of the figure. Part 74 is the switch that turns the Auto Expressionator on and off.

The service manuals of that era say that if the bulbs burn out, you must replace them with identical bulbs, otherwise the volume expansion will not work properly. Presumably, you would have had to write to Crosley to get

replacements, since I have never seen Crosley exact replacement bulbs listed in any of my old parts catalogs. If you were to run across spare bulbs of this type in your junk box that were not in the original Crosley boxes, you would probably assume they were ordinary flashlight bulbs.

I am guessing that these bulbs had long life since they were lit only during loud passages. If you have one of these sets and find the bulbs burned out, you can still operate the set normally with the Auto Expressionator switch off. You could probably use an ordinary bulb of a comparable filament resistance and the radio would still play in the Auto Expressionator mode, but without the right temperature coefficient filament, the volume expansion would likely not work right. In principle, it should be possible to make a replacement for the bulb by locating some wire with a high temperature coefficient and winding it non-inductively on a suitable form, say a glass rod, until the cold resistance was comparable to that of the original bulb. (This assumes you can find someone with an original bulb to tell you what the cold resistance is.)

On some of the less expensive Crosley models, a simpler volume expander circuit without the bass compensation was used. An example is the Model 1016 (Rider's, Crosley page 7-63 and following). Fig. 5 shows a portion of the schematic. Item 65, between the 6N6 output tube and the loudspeaker, is a dual variable resistance element, although in this set, the two elements are wired together. This is a glass tube that fits into a standard tube socket,

and goes by Crosley part number W41187.

In these sets, the less elaborate volume expansion circuit was usually referred to as the "Phantom Conductor." Item 65 was called the Phantom Conductor tube and the switch to its left, item 68, was the Phantom Conductor switch. Like the special bulbs in the Auto Expressionator, the Phantom Conductor tube would be very difficult to find if you had to replace one.

Other examples of Crosleys that used volume expansion are the Models 816, 916, 955, and 1316. By the time of World War II, Crosley, like most other manufacturers, was trying to cut costs, and fancy circuits like the Auto Expressionator and the Phantom Conductor fell by the wayside.

I have never actually restored one of these Crosleys. My information comes strictly from old literature. It would be interesting to see a plot of the frequency response of the audio section in a Crosley employing the Auto Expressionator circuit. If you have had any interesting experiences working on these sets, finding replacements for Auto Expressionator bulbs or the Phantom Conductor tube, or have done a response plot for the audio section, write to us! 



A job well done. Here is Mark Toppo after he finished restoring the WLW's cabinet. According to Mark and Martin, the radio had been sitting in water and the lower part of the radio had rotted away and had to be rebuilt.

At right, Martin as a dial face.





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Hollow music! Something missing! There are notes and tonal beauties you NEVER hear with an ordinary radio. Why cheat yourself of FULL radio enjoyment, when ZEN-ITCH TONE-TOTALITY leaves NOTHING unheard.

This advertisement not paid for. Wish it were, though!

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